

WASHINGTON DEPARTMENT OF ECOLOGY
ENVIRONMENTAL ASSESSMENT PROGRAM
FRESHWATER MONITORING UNIT
STREAM DISCHARGE TECHNICAL NOTES

STATION ID: 40A070
STATION NAME: Squilchuck Creen below Picher Canyon
WATER YEAR: 2011
AUTHOR: Michael S. Anderson

Introduction

Watershed Description

Squilchuck Creek is a tributary of the Columbia River, located south of the city of Wenatchee, Washington. The drainage extends from the Columbia River to Mission Ridge (elevation 6,280 feet), and is bounded by Dry Creek to the north and Stemilt Creek to the south. The upper Squilchuck basin is predominantly forested and includes the Mission Ridge ski area and Squilchuck State Park. The lower portion of the basin is mostly undeveloped shrub-steppe with some residential and agricultural development along the stream corridor. Annual precipitation averages 20.8 inches, with a substantial portion falling in the upper basin as snow. Snow-making operations are conducted at the ski resort.

Gage Location

The Squilchuck Creek below Pitcher Canyon stream gage is located on the left bank of Squilchuck Creek off Squilchuck Road above the Lovitt Tailings Pond (inactive) at RM 2.0. At this location, the stream channel is a lined with concrete.

Table 1.

Drainage Area (square miles)	26.43
Latitude (degrees, minutes, seconds)	47° 22' 42" N
Longitude (degrees, minutes, seconds)	120° 18' 51" W

Discharge

Table 2. Discharge Statistics.

Mean Annual Discharge (cfs)	10
Median Annual Discharge (cfs)	6.0
Maximum Daily Mean Discharge (cfs)	53
Minimum Daily Mean Discharge (cfs)	2.8
Maximum Instantaneous Discharge (cfs)	69
Minimum Instantaneous Discharge (cfs)	2.2
Discharge Equaled or Exceeded 10 % of Recorded Time (cfs)	27
Discharge Equaled or Exceeded 90 % of Recorded Time (cfs)	3.7
Number of Days Discharge is Greater Than Range of Ratings	0
Number of Days Discharge is Less Than Range of Ratings	0

Note: Statistics displayed in Table 2 may not include values in which the predicted discharge exceeds the range of ratings.

Narrative

In water year 2011, six discharge measurements were conducted at a range of flows from 3.6 cfs to 32 cfs. The channel was ice-impacted intermittently throughout the winter season. Peak discharges occurred in May as snow melted in the upper portions of the basin; low flows were observed in mid-September.

Error Analysis

Table 3. Error Analysis Summary.

Logger Drift Error (% of discharge)	32.8%
Weighted Rating Error (% of discharge)	9.1%
Total Potential Error (% of discharge)	41.9%

Rating Table(s)

Table 4. Rating Table Summary

Rating Table No.	303	204	304
Period of Ratings	10/1/2010-1/30/2011	1/17/2011-3/28/2011	2/24/2011-9/15/2011
Range of Ratings (cfs)	0.93-64.6	0.31 to 64.6	0.93-64.6
No. of Defining Measurements	12	18	12
Rating Error (%)	8.6	10.8	8.6

Rating Table No.	205		
Period of Ratings	8/9/2011-9/30/2011		
Range of Ratings (cfs)	0.31 to 64.6		
No. of Defining Measurements	18		
Rating Error (%)	10.8		

Rating Table No.			
Period of Ratings			
Range of Ratings (cfs)			
No. of Defining Measurements			
Rating Error (%)			

Narrative

Water year 2011 began in a period of phased transition between Rating Table #303 and Rating Table #204. Over the course of the year, the rating shifted back and forth between an upper and a lower rating. Shifts in the rating appear to be driven by the accumulation and flushing of debris from behind the pipe extending into the stream from the gaging station. In some cases, these shifts could be tied to specific events; but in other cases there was no definitive evidence in the record of when a shift occurred. As a result, there are numerous occurrences of long transitional periods between ratings. It is likely that shifting occurred more frequently during some portions of the water year than it was possible to account for because the shifts were more frequent than field observations. The uncertainty associated with frequent shifting is likely a major contributor to the total potential error.

Stage Record

Table 5. Stage Record Summary

Minimum Recorded Stage (feet)	4.77
Maximum Recorded Stage (feet)	6.84
Range of Recorded Stage (feet)	2.07
Number of Un-Reported Days	31
Number of Days Qualified as Estimates	289
Number of Days Qualified as Unreliable Estimates	0

Narrative

Thirty-one days were not reported because the channel was ice-impacted and the stage-discharge relationship was not valid.

Of the 289 days qualified as estimates, 250 were identified as estimates and 11 as questionable estimates by drift analysis. The remainder of the estimated days were between periods of ice-impacted data and the next ice-free stage observation.

Strong sensitivity drift was detected in the stage record, and a correction was applied to the entire stage record prior to error analysis. It is likely this adjustment contributed to the high potential error in this water year.

Modeled Discharge

Table 6. Model Summary

Model Type (Slope conveyance, other, none)	None
Range of Modeled Stage (feet)	n/a
Range of Modeled Discharge (cfs)	n/a
Valid Period for Model	n/a
Model Confidence	n/a

Surveys

Table 7. Survey Type and Date (station, cross section, longitudinal)

Type	Date
None	N/A

Activities Completed

No additional activities were conducted this water year.